



INVESTIGATOR'S ANNUAL REPORT

United States Department of the Interior
National Park Service

All or some of the information you provide may become available to the public.

OMB # (1024-0236)
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Form No. (10-226)

Reporting Year: 2005	Park: Shenandoah NP	Select the type of permit this report addresses: Scientific Study	
Name of principal investigator or responsible official: Linda Aucoin		Office Phone: 434-982-5487	
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Additional investigators or key field assistants (first name, last name, office phone, office email) Name: Henry M. Wilbur Phone: 434-982-5486 Email: hmw3q@virginia.edu			
Project Title (maximum 300 characters): The effects of pH on the distribution and abundance of salamanders in headwater streams			
Park-assigned Study or Activity #: SHEN-00291	Park-assigned Permit #: SHEN-2003-SCI-0016	Permit Start Date: May 27, 2003	Permit Expiration Date: Sep 30, 2005
Scientific Study Starting Date: May 06, 2005		Estimated Scientific Study Ending Date: Sep 30, 2010	
For either a Scientific Study or a Science Education Activity, the status is: Continuing		For a Scientific Study that is completed, please check each of the following that applies: <input type="checkbox"/> A final report has been provided to the park or will be provided to the park within the next two years <input type="checkbox"/> Copies of field notes, data files, photos, or other study records, as agreed, have been provided to the park <input type="checkbox"/> All collected and retained specimens have been cataloged into the NPS catalog system and NPS has processed loan agreements as needed	
Activity Type: Research			
Subject/Discipline: Ecology (Aquatic, Marine, Terrestrial)			

Purpose of Scientific Study or Science Education Activity during the reporting year (maximum 4000 characters):

To determine the characteristics of headwater stream habitat that best explain the distribution and abundance of stream salamanders, with an emphasis on bedrock- and ANC-related attributes. The work in Shenandoah National Park was a subset of a larger state-wide survey, intended to complement experimental tests conducted at Mountain Lake Biological Station, Giles County, VA.

Findings and status of Scientific Study or accomplishments of Science Education Activity during the reporting year (maximum 4000 characters):

The population and community dynamics of stream salamander communities are shaped by interspecific interactions and the influence of abiotic factors such as acidity. Salamanders may be distributed unequally between nearly neutral and acidic waters due to individual physiological tolerances to acidity. I surveyed 58 streams in western Virginia to compare stream salamander populations between

streams with low versus high acid-neutralizing capacity (ANC). Twenty-four (24) of these streams were located within Shenandoah National Park. Estimates of occupancy (\hat{I}) from proportion of area occupied (PAO) models were generally high (> 0.83 for five of seven stream salamander species) among all streams. Although occupancy was not affected by stream ANC, the abundance of *Desmognathus monticola* was higher in low ANC streams. In addition, the abundance of eight species was influenced by the number of cover objects, stream depth, relative insect abundance, the moon phase, and time of year. Stream salamander body size was larger in low ANC streams. Body size also varied with the relative insect abundance and time of year. There were significant differences in size among streams in different river watersheds and with different stream ANC. River watersheds differed in the presence or absence of two stream salamanders, *Desmognathus quadramaculatus* and *D. ochrophaeus*. Previous research has shown that species-specific variation in acid tolerance can affect interspecific interactions, and these results indicate that changes to species interactions in low ANC streams has affected the distributions and abundances of salamanders populations. Detection probabilities in this study were high ($p = 0.60$ to 0.99), and the methodology used is recommended for amphibian monitoring programs in the southern Appalachians.

The work summarized above will continue over the next 5 years in an effort to monitor a subset of the 58 streams across time.

For Scientific Studies (not Science Education Activities), were any specimens collected and removed from the park but not destroyed during analysis?

Yes

If “Yes”, identify where the specimens currently are stored:

5 preserved specimens (*Gyrinophilus porphyriticus*) are stored at the University of Virginia, as approved by park personnel.

Funding specifically used in this park this reporting year that was provided by NPS (enter dollar amount):

\$0

Funding specifically used in this park this reporting year that was provided by all other sources (enter dollar amount):

\$1200

List any other U.S. Government Agencies supporting this study or activity and the funding each provided this reporting year:

Paperwork Reduction Act Statement: A federal agency may not conduct or sponsor, and a person is not required to respond to a collection of information unless it displays a valid OMB control number. Public reporting for this collection of information is estimated to average 1.625 hours per response, including the time for reviewing instructions, gathering and maintaining data, and completing and reviewing the forms. Direct comments regarding this burden estimate or any aspect of this form to Dr. John G. Dennis, Natural Resources (3127 MIB), National Park Service, 1849 C Street, N.W., Washington, DC 20240.